

REMARKS

Reconsideration of this application and entry of the foregoing amendments are respectfully requested.

Claims 1 and 11 have been amended, and claims 9 and 10 have been deleted.

The amendments to claims 1 and 11 are supported by the recitations of original claims 9 and 10. Further support for the amendments to claims 1 and 11 may be found in the present specification at page 18, line 13 to page 19, line 16. It will be noted that the interface layer (between the base layer and the emitter layer) recited in the amendment to claim 1, corresponds to interface layer 14a, which is illustrated in Figure 8. It will further be noted that the "another interface layer" (between the base layer and the collector layer) recited in the amendment to claim 11, corresponds to interface layer 12a, which is also illustrated in Figure 8.

For the reasons given on pages 2-5 of the Official Action, claims 1, 2 and 4-8 are rejected under 35 U.S.C. 103(a) over Furukawa in view of "Admitted Prior Art".

This rejection has been obviated by the foregoing amendments, whereby embodiments of claims 9 and 10 have been incorporated into claims 1 and 11.

For the reasons given on pages 3-5 of the Official Action, claims 1, 2 and 4-11 are rejected under 35 U.S.C. 103 (a) over JP '834 in view of Furukawa '614.

This rejection is respectfully traversed.

As set forth in page 11, second paragraph of the specification, the present invention uses the phenomenon of bandgap decrease caused in Si or a SiGeC mixed crystal system as a result of addition of C and achieves the desired accelerated operation of HBT by reducing the height of the band spike formed at the interface between the base layer and the emitter layer or at the interface

between the collector layer and the base layer.

Please note that the present invention avoids the use of SiC or SiGeC mixed crystal for the emitter layer, which is required to have a wide bandgap. Incorporation of C into such a region would inevitably cause reduction of the bandgap.

Furukawa teaches the use of a SiGeC mixed crystal for the base layer 43 merely for achieving lattice matching. Furukawa is entirely silent about the problem of spike formation at the base/emitter or emitter/collector interface, contrary to the present invention. Thus, the subject matter of the present invention would never be anticipated from Furukawa.

JP '834 is based on a wrong knowledge that the incorporation of C into Si or SiGe mixed crystal increases the bandgap and thus incorporates a large amount of C into the emitter layer. This is entirely contradictory to the present invention. Applicant further wishes to point out that FIG. 1(b) of JP '834 is a band diagram and the inclined curve for the base layer is not the compositional profile of C in the base layer.

Further, JP '834 is silent about the problem of spike formation at the base/emitter or emitter/collector interface, and there is no reason that a person skilled in the art is motivated to form an interface layer enriched in C at the interface between the base layer and the emitter layer as set forth in amended claim 1 or between the base layer and the collector layer as set forth in amended claim 11.

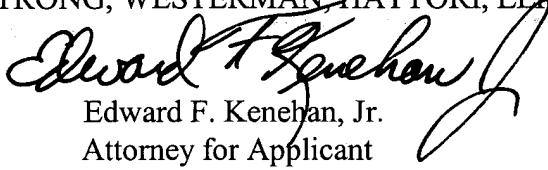
Accordingly, the rejections under 35 USC 103 should be withdrawn.

Allowance is requested. However, in the event that the Examiner is not persuaded to allow the present application, then entry of the foregoing amendments is requested for the purposes of appeal.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. The fees for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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Attachments: Version with markings to show changes made

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the claims:

Please amend claims 1 and 11 and cancel claims 9 and 10 as follows.

1. (Amended) A heterobipolar transistor, comprising:

a substrate;

a collector layer of Si formed on said substrate;

a base layer formed on said collector layer; and

an emitter layer of Si formed on said base layer,

said base layer comprising a SiGeC ternary mixed crystal having a C concentration profile such that a C concentration in said base layer increases from a first interface facing said emitter layer to a second interface facing said collector layer,

wherein there is formed an interface layer between said base layer and said emitter layer such that said interface layer contains Si and C.

11. (Amended) A heterobipolar transistor as claimed in claim [10] 1, wherein [both of said first and second regions contain C] there is formed another interface layer between said base layer and said collector layer such that said another interface layer contains Si and C.

Claims 9 and 10 have been canceled.